Automated Mapping Information for ALTO

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Problem Statement

Why automate mapping generation?

• Complexity:
  • Thousands of routers (≥ 3400 in large ISP)
  • Thousands of (IGP) links (≥ 10000 in large ISP)

• Diversity:
  • Different customers
  • Different mapping engines
  • Different requirements
  • Different capabilities
  • Different detail levels

• Actuality:
  • Changes in network should be available ASAP

There is no one size fits all
Not manually handable
Getting started

• Network Map
  • CIDRs
  • Grouping Criteria
• Cost Map
  • Affinity Criteria

What do we need to automatically generate mapping information?

Data, Data and Data
CIDRs and Topology

- Sources → Routing Protocols
- IGP (ISIS/OSPF)
  - Topology
  - CIDRs
- BGP
  - Internal CIDRs (iBGP)
  - External CIDRs (eBGP)

Data from one BGP router might not be enough
→ Multi peering points with other networks (e.g. CDN)
→ Information from (all) edge routers necessary
CIDRs and Topology II

Now we can start generating maps → Sorry, not yet

- View ends on network border
- From ISP perspective: Most traffic come from outside the network
- Problem: Routing Protocols only tell us forward path → how to get to CIDR
- Network entry point cannot be derived from routing protocols

Mechanism to detect where flows enter the network required
Detecting Ingress Points

• Passive Measurement
  • Processing flow information (Netflow, sFlow)
  • Collect flow information on all border router interfaces
  • Statistically evaluate flow records to find common subnet ranges
  • Provides CIDR, router + interface information

→ Very heavy operation
Detecting Ingress Points II

- **Active Measurement**
  - Content provider detects ingress router by tracing paths to client
    - First router in target network
    - Detectable via IP, host name
    - Counter part to own border router in private peering
  - Channel into ALTO server to provide ingress points

**Idea:** Integrate such information into ALTO Map requests
Integrate information into ALTO Map requests

• Network/Cost Map requests provide additional information
  → E.g. Ingress Points
• Network/Cost Map request must support HTTP POST requests
• Maps cannot be (fully) precalculated anymore
  → Calculation must be efficient

Is this something worth pursuing?
Additional Data

Now we can start generating maps → yes, but ...

Depending on requirements additional data might be necessary

- Performance stats (e.g. from SNMP)
- Geoinformation
- Content server information
- Type of Content
- ...

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Summary

• Manual maps design not feasible due to complexity, diversity and actuality
• A lot different data sources required
• Routing protocols alone are not enough
  → Ingress Points necessary for external sources
• Potential future work: Integrate processing relevant information in ALTO requests

Thank You

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